



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/811,982

03/30/2004

Atul Puri

13316-3277

3132

23838 7590 10/15/2008  
KENYON & KENYON LLP  
1500 K STREET N.W.  
SUITE 700  
WASHINGTON, DC 20005

EXAMINER

HOLDER, ANNER N

ART UNIT

PAPER NUMBER

2621

MAIL DATE

DELIVERY MODE

10/15/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/811,982	<b>Applicant(s)</b> PURI ET AL.	
	<b>Examiner</b> ANNER HOLDER	<b>Art Unit</b> 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/17/08; 08/18/08</u> .                                      | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments, see page 6 35 USC 112, filed 06/19/08, with respect to claims 5, 6 and 17-19 have been fully considered and are persuasive. The rejection of claims 5, 6 and 17-19 has been withdrawn.
2. Applicant's arguments with respect to claims 1-27 have been considered but are moot in view of the new ground(s) of rejection.
3. Applicant's arguments filed 06/19/08 have been fully considered but they are not persuasive. As to Applicant's arguments regarding Hui, Examiner respectfully disagrees. The encoding quality measure and picture complexity combine to produce the frame quality which contributes to the determining of the target bit rate. [fig. 3 (320, 324, 316); col. 12 line 24-33] Hui teaches the compressed moving picture will meet the target bit rate using a virtual buffer to ensure the maximum bit rate of the output stream is not violated. One of ordinary skill in the art understand this is accomplished by the transmit buffer overflow detection (virtual buffer verification). Examiner respectfully disagrees with Applicant's arguments regarding claims 8, 15-27. The prior art fairly suggest and teaches the limitations as claimed.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4 and 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hui US 6,654,417 B1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991.

6. As to claim 1, Hui teaches determining a target bitrate for a picture in the sequence based on the picture's complexity, [Fig. 2 (222); Fig. 3 (322)] generating a first quantizer estimate for the picture based on a fullness indicator from a transmit buffer of a video coder, [Col. 9 lines 31-34] generating a second quantizer estimate for the picture of quantizer assignments made to prior pictures of a same type, actual coding rates achieved by such quantizer assignments and the target bitrate, [Col. 9 lines 38-43] and selecting a quantizer based on a difference between the two quantizer estimates and based on the picture's complexity. [Col. 3 lines 64-65; Fig. 3 (306, 312-322); Col. 12 lines 24-33; fig. 2 (220); fig. 3 (320); col. 7 line 61 - col. 8 line 11]

Hui is silent as to the use of linear regression regarding a quantizer.

Ribas teaches linear regression in determining a quantizer value. [col. 6 lines 62-65; col. 7 lines 37-48]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the linear regression teachings of Ribas with the device of Hui improving image quality and coding efficiency. [col. 2 lines 33-36]

7. As to claim 2, Hui (modified by Ribas) teaches the picture's complexity is determined by analyzing spatial complexity within the picture. [Hui - Col. 6 lines 9-19; Col. 12 lines 18-22]

8. As to claim 3, Hui (modified by Ribas) teaches the picture's complexity is determined by analyzing motion complexity of the picture with respect to previously coded pictures. [Hui - Fig. 2; Fig. 3; Col. 6 lines 9-19]

9. As to claim 4, Hui (modified by Ribas) teaches the picture's complexity is determined by analyzing a number of bits used to represent each pixel in the picture. [Hui - Col. 4 lines 16-31]

10. As to claim 8, Hui (modified by Ribas) teaches selecting a coding mode for blocks of the picture according to a rate control policy selected for the picture. [Hui - Col. 5 lines 58-67]

11. As to claim 9, Hui (modified by Ribas) teaches the target bitrate is determined based on a number of bits (R) allocated to represent a group of pictures to which the picture belongs, a number (N) of like-kind pictures that will occur in the group of pictures. [Hui - Fig. 2; Fig. 3; Col. 11 lines 1-24; Col. 12 lines 24-33]

12. As to claim 10, Hui (modified by Ribas) teaches when the picture is an I picture, the target bitrate  $T_{sub.i}$  is determined by:  $T_i = \max [ R ( 1 + N_P X P X I K_P + N_B X B X I K_B ) , \text{bitrate} \times 8 \times \text{picturerate} ]$ , where R represents a number of bits allocated to code a group of pictures in which the I picture resides,  $N_{sub.P}$  and  $N_{sub.B}$  respectively represent the number of P and B pictures that appear in a group of frames,  $X_{sub.I}$  and  $X_{sub.P}$  respectively represent complexity estimates for the I and P pictures in the group of frames,  $K_{sub.P}$  is a constant,  $K_{sub.B}$  is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the

Art Unit: 2621

group of pictures, and picturerate represents the number of pictures in the group of pictures. [Hui - Col. 6 line 55- Col. 7 line 5; Col. 11 lines 40-60]

13. As to claim 11, Hui (modified by Ribas) teaches when the picture is a P picture, the target bitrate  $T_{sub.p}$  is determined by:  $T_P = \max [ R ( N_P + N_B K_P X_B K_B X_P ) , \text{bitrate} \times \text{picturerate} ]$ , where R represents a number of bits allocated to code a group of pictures in which the P picture resides,  $N_{sub.P}$  and  $N_{sub.B}$  respectively represent the number of P and B pictures that appear in a group of frames,  $X_{sub.I}$  and  $X_{sub.P}$  respectively represent complexity estimates for the I and P pictures in the group of frames,  $K_{sub.P}$  is a constant,  $K_{sub.B}$  is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picturerate represents the number of pictures in the group of pictures. [Hui - Col. 6 line 55- Col. 7 line 5; Col. 11 lines 40-65]

14. As to claim 12, Hui (modified by Ribas) teaches when the picture is a B picture, the target bitrate  $T_{sub.b}$  is determined by:  $16 T_B = \max [ R ( N_B + N_P K_B X_P K_P X_B ) , \text{bitrate} \times \text{picturerate} ]$ , where  $N_{sub.P}$  and  $N_{sub.B}$  respectively represent the number of P and B pictures that appear in a group of frames,  $X_{sub.I}$  and  $X_{sub.P}$  respectively represent complexity estimates for the I and P pictures in the group of frames,  $K_{sub.P}$  is a constant,  $K_{sub.B}$  is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picturerate represents the number of pictures in the group of pictures. [Hui - Col. 6 line 55- Col. 7 line 5; Col. 11 lines 10-65]

15. As to claim 13, Hui (modified by Ribas) teaches when the picture is an I picture, the linear regression is performed using predetermined assumed values for the prior quantizer assignments and actual coding rates. [Ribas - col. 6 lines 62-65; col. 7 lines 37-48]

16. As to claim 14, Hui (modified by Ribas) teaches when the picture is an P picture, the linear regression is performed using quantizer assignments and actual coding rates for three prior P pictures. [Ribas - col. 6 lines 62-65; col. 7 lines 37-48]

17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hui US 6,654,417 B1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991 further in view Vogel US 5,343,247.

18. As to claim 5, Hui (modified by Ribas) teaches limitations of claim 1.

Hui (modified by Ribas) is silent as to selectively canceling transform coefficients of coded blocks in the picture according to a rate control policy selected for the picture.

Vogel teaches selectively canceling transform coefficients of coded blocks in the picture according to a rate control policy selected for the picture. [Fig. 2; Fig. 3; Col. 3 lines 61-63]

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the device of Hui (modified by Ribas) to improve image quality.

19. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hui US 6,654,417 B1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991 further in view Suzuki US 6,937,656 B2.

20. As to claim 6, Hui (modified by Ribas) teaches the limitations of claim 1.

Hui is silent as to selectively canceling motion vectors of coded blocks in the picture according to a rate control policy selected for the picture.

Suzuki teaches selectively canceling motion vectors of coded blocks in the picture according to a rate control policy selected for the picture. [Col. 9 lines 14-19]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Suzuki with the device of Hui (modified by Ribas) to improve coding efficiency.

21. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia US 2004/0146108 A1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991 and further in view of Sugiyama US 6,940,911 B2.

22. As to claim 7, Hui (modified by Ribas) teaches the limitations of claim 1.

Hui (modified by Ribas) is silent as to decimating pictures within the video sequence according to a rate control policy selected for the picture.

Sugiyama teaches decimating pictures within the video sequence according to a rate control policy selected for the picture. [Fig. 7; Fig. 11; Fig. 14; Col. 15 lines 10-19, 61-67; Col. 16 lines 3-7]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sugiyama with the device of Hui modified by Ribas allowing for improving the image quality.

23. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia US 2004/0146108 A1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991.

24. As to claim 15, Hsia teaches a scene content analyzer having an input for source video data and an output for complexity indicators representing complexity of each picture in the source video data, a first quantizer estimator [Abstract; Fig. 3 (Scene Detection Module, Quantization Decision Module, and Picture Type Decision Module); Pg. 4-5 ¶ 0045-0046] having an input for the source video data and complexity indicators, to generate a quantizer estimate of a picture based on a calculation of a target rate for coding the picture, [Fig. 3 (Quantization Decision Module); Abstract; Pg. 0044] a second quantizer estimator having an input for the complexity indicators and past values of quantizer selections and coding rates achieved therefrom, the second quantizer estimator to generate a second quantizer estimate for the picture based on a prior quantizer selections and coding rates for like-kind pictures, [Fig. 3 (Quantization Decision Module)] and a coding adapter, having inputs for the two quantizer estimates and the complexity indicators to select a quantizer for the picture based on a difference of the two quantizer estimates. [Abstract; Fig. 3 (Scene Detection Module, Quantization Decision Module, and Picture Type Decision Module); Pg. 4-5 ¶ 0045-0046]

Hsia is silent as to linear regression modeling quantization.

Ribas teaches linear regression modeling quantization. [col. 6 lines 62-65; col. 7 lines 37-48]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the linear regression teachings of Ribas with the device of Hsia improving image quality and coding efficiency.

Art Unit: 2621

25. As to claim 16, Hsia (modified by Ribas) teaches the coding adapter comprises a subtractor having inputs for the two quantizer estimates. [Hsia - Abstract; Fig. 3 (Scene Detection Module – Scene Change Detection); Pg. 4-5 ¶ 0044-0046]

26. Claims 17-19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia US 2004/0146108 A1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991 and further in view of Mitchell et al. (Mitchell) US 6,256,422 B1.

27. As to claim 17, Hsia (modified by Ribas) teaches a subtractor having inputs for the two quantizer estimates. [Fig. 3 (Scene Detection Module); Pg. 4-5 ¶ 0045]

Hsia (modified by Ribas) is silent as to a clipper coupled to an output of the subtractor.

Mitchell teaches a clipper coupled to an output of the subtractor. [Fig. 11(a); Col. 13 lines 28-61]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the clipper teachings of Mitchell with the device of Hsia modified by Ribas to allow for removal of errors within an allowed range. [Mitchell - Abstract]

28. As to claim 19, Hsia (modified by Ribas and Mitchell) teaches a subtractor having a first input coupled to the output of the clipper and a second input for a value of a quantizer of a previously processed picture. [Fig. 11(a); Col. 13 lines 28-61; Hsia – Fig. 3 (Mode Decision Mode)]

29. As to claim 20, Hsia (modified by Ribas and Mitchell) teaches the coding adapter comprises a lookup table indexed by a complexity indicator representing complexity of the picture and the picture's coding type. [Mitchell - Col. 6 lines 26-34]

30. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia US 2004/0146108 A1 in view of Ribas-Corbera et al. (Ribas) US 6,111,991 in view of Mitchell et al. (Mitchell) US 6,256,422 B1 and further in view of Hui US 6,654,417 B1.

31. As to claim 18, Hsia (modified by Ribas and Mitchell) teaches the limitations of claim 17.

Hui (modified by Ribas) teaches a divider. [Fig. 2; Col. 48-51]

32. Claims 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hui US 6,654,417 B1 in view of Hsia US 2004/0146108 A1.

33. As to claim 21, Hui teaches for a plurality of macroblocks of an input picture, computing variances of a plurality of blocks therein, comparing minimum variance values of the plurality of macroblocks to corresponding minimum variance values of macroblocks from a prior picture, [Fig. 2 (202, 203); Fig. 3 (303, 302); Col. 8 lines 50-51; Col. 8 line 66 - Col. 9 line 3; Col. 12 lines 18-23] calculating an activity level of the input picture from the variances, comparing the activity level of the input picture to an activity level of the prior picture. [Fig. 2 (202, 216, 217); Fig. 3 (302, 316, 317); Col. 9 lines 38-47; Col. 12 lines 24-33]

Hui is silent as to the generation of a scene change decision.

Hsia teaches generating a scene change decision . [Fig. 3 (Scene Detection Module); Pg. 4-5 ¶ 0045]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hsia with the device of Hui improving image quality and coding efficiency.

34. As to claim 22, Hui (modified by Hsia) teaches averaging the minimum variance values of each macroblock in the input picture, averaging minimum variance values of each macroblock in the prior picture, and comparing the average minimum variance values of the input picture to the average minimum variance values of the prior picture. [Hui - Fig. 3; Fig. 2; Col. 9 lines 38-47; Col. 12 lines 24-33; Hsia - Fig. 3; Pg. 4-5 ¶ 0044-0046]

35. As to claim 23, Hui (modified by Hsia) teaches averaging the minimum variance values of each macroblock in the input picture, averaging minimum variance values of each macroblock in the prior picture, normalizing each of the average minimum variance values, [Hui – Fig. 2 (216, 217); Fig. 3 (316, 317); Col. 9 lines 37-47; Col. 12 lines 24-33] and determining a ratio between the normalized values of the input picture to the normalized values of the prior picture, and comparing the ratio to a predetermined threshold. [Hui - Col. 6 line 60 - Col. 7 line 41, equation within cited portion of shows the use of the activity ratio; Col. 9 lines 37-47]

36. As to claim 24, Hui (modified by Hsia) teaches averaging variances of all blocks in the picture, and comparing the average variance value to the average minimum variance value for the picture. [Hui – Fig. 2 (216, 217); Fig. 3 (316, 317); Col. 9 lines 37-47; Col. 12 lines 24-33]

37. As to claim 25, Hui (modified by Hsia) teaches the comparison of activity levels comprises: determining a ratio between the activity level of the input picture and the activity level of the prior picture, and comparing the ratio to a predetermined threshold. [Hui - Col. 6 line 60 - Col. 7 line 41, equation within cited portion of shows the use of the activity ratio; Col. 9 lines 37-47]

38. As to claim 26, Hui (modified by Hsia) teaches normalizing activity levels for the input picture, normalizing activity levels for the prior picture, and comparing the normalized activity levels to each other. [Hui – Fig. 2 (216, 217); Fig. 3 (316, 317); Col. 9 lines 37-47; Col. 12 lines 24-33]

39. As to claim 27, Hui teaches variance calculator to calculate a plurality of variance values for each macroblock in a source image, Fig. 2 (202, 203); Fig. 3 (303, 302); Col. 8 lines 50-51; Col. 8 line 66 - Col. 9 line 3; Col. 12 lines 18-23] a minimum variance selector to select a minimum variance value for each macroblock, [a memory to store minimum variance values of a previously processed image, [Fig. 2(201); Fig. 3(301)] a comparator to compare the minimum variance values of the source image to the minimum variance values of the previously processed image, an averager to calculate an average variance value for each macroblock, an activity calculate to calculate an activity level of the source image from the average variance values. [Fig. 2 (216); Fig. 3 (316)]

Hui is silent as to decision logic to signal that the scene change based on a comparison of an output from the comparator and the activity level of the source image.

Hsia teaches decision logic to signal that the scene change based on a comparison of an output from the comparator and the activity level of the source image. [Fig. 3 - Picture Decision Module]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hsia with the device of Hui improving image quality and coding efficiency.

### ***Conclusion***

40. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

41. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNER HOLDER whose telephone number is (571)270-1549. The examiner can normally be reached on M-Th, M-F 8 am - 3 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ANH 09/29/08

/Tung Vo/  
Primary Examiner, Art Unit 2621